

WHAT IS CLAIMED IS:

1. A method of producing a semiconductor thin film, comprising the step of rotating a thin film support member having a curved surface while supporting
5 a semiconductor thin film formed on a substrate, on the curved surface of the thin film support member, thereby peeling the semiconductor thin film away from the substrate.

10 2. The method according to Claim 1, wherein the radius of curvature of the curved surface increases with progress of the peeling.

15 3. The method according to Claim 1, wherein a film with flexibility is bonded to the semiconductor thin film and the thin film support member is rotated while the film is kept in contact with the curved surface of the thin film support member.

20 4. The method according to Claim 3, wherein the film is an adhesive film comprising a film base and an adhesive.

25 5. The method according to Claim 3, wherein the film is bonded while being pressed using the thin film support member.

6. The method according to Claim 3, wherein an energy is applied to an adhesive for bonding the film to the semiconductor thin film to cure the adhesive.

5 7. The method according to Claim 1, comprising the step of forming a separation layer for the semiconductor thin film before formation of the semiconductor thin film.

10 8. The method according to Claim 1, wherein a peeling assist force is applied between the substrate and the semiconductor thin film.

15 9. The method according to Claim 1, wherein the semiconductor thin film has a pn junction.

20 10. The method according to Claim 1, wherein the thin film support member is rotated without a slip on a substrate support member for supporting the substrate.

25 11. A method of producing a semiconductor thin film, comprising the step of peeling a semiconductor thin film formed on a substrate away from the substrate, wherein the magnitude of an external force for peeling the semiconductor thin film decreases with progress of the peeling.

12. The method according to Claim 11, comprising the step of forming a separation layer for the semiconductor thin film before formation of the semiconductor thin film.

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13. The method according to Claim 11, wherein a peeling assist force is applied between the substrate and the semiconductor thin film.

10 14. The method according to Claim 11, wherein the semiconductor thin film has a pn junction.

15 15. A method of producing a semiconductor thin film, comprising the step of peeling a semiconductor thin film formed on a substrate away from the substrate, wherein the step of peeling is carried out after the substrate is secured on a substrate support member without an adhesive.

20 16. The method according to Claim 15, wherein the substrate is secured by either one selected from vacuum suction, electrostatic suction, a securing claw, or a combination thereof.

25 17. The method according to Claim 15, wherein the holding power of the substrate decreases with distance from a start point of the peeling.

18. The method according to Claim 15, wherein an elastic member is interposed between the substrate and the substrate support member.

5 19. A method of producing a solar cell,
comprising the step of forming a separation layer on a
substrate and forming a semiconductor thin film having
a semiconductor layer of a first conductivity type and
a semiconductor layer of a second conductivity type on
10 the separation layer, the step of bonding a light-
transmitting film onto the semiconductor thin film with
a light-transmitting adhesive, the step of exerting an
external force on the light-transmitting film and
thereby peeling the semiconductor thin film away from
15 the substrate, and the step of forming an electrode on
a back surface of the semiconductor thin film thus
peeled.

20 20. The method according to Claim 19, wherein the
peeling is carried out by rotating a thin film support
member having a curved surface while supporting the
light-transmitting film on the curved surface of the
thin film support member.

25 21. A method of producing a solar cell,
comprising the step of forming a separation layer on a
substrate and forming a semiconductor thin film of a

first conductivity type on the separation layer, the step of bonding a light-transmitting film onto the semiconductor thin film of the first conductivity type with a light-transmitting adhesive, the step of
5 exerting an external force on the light-transmitting film and thereby peeling the semiconductor thin film of the first conductivity type away from the substrate, the step of forming a semiconductor thin film of a second conductivity type on a back surface of the first
10 semiconductor thin film thus peeled, and the step of forming an electrode on the semiconductor thin film of the second conductivity type.

22. The method according to Claim 21, wherein the
15 peeling is carried out by rotating a thin film support member having a curved surface while supporting the light-transmitting film on the curved surface of the thin film support member.

20 23. A method of producing a semiconductor thin film, comprising the step of peeling a semiconductor thin film formed on a substrate away from the substrate, wherein the peeling rate of the semiconductor thin film is decreased with progress of
25 the peeling.

24. The method according to Claim 23, comprising

the step of forming a separation layer for the semiconductor thin film before formation of the semiconductor thin film.

5 25. The method according to Claim 23, wherein a peeling assist force is applied between the substrate and the semiconductor thin film.

10 26. The method according to Claim 23, wherein the semiconductor thin film has a pn junction.

15 27. A method of producing a solar cell, comprising the step of forming a separation layer on a substrate and forming a semiconductor thin film having a first semiconductor layer of a first conductivity type and a second semiconductor layer of a second conductivity type on the separation layer, the step of bonding an electroconductive film onto the semiconductor thin film with an electroconductive adhesive, the step of exerting an external force on the electroconductive film and thereby peeling the semiconductor thin film away from the substrate, and the step of forming an electrode on a back surface of the semiconductor thin film thus peeled.

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28. The method according to Claim 27, wherein the peeling is carried out by rotating a thin film support

member having a curved surface while supporting the electroconductive film on the curved surface of the thin film support member.

- 5 29. The method according to Claim 27, wherein the peeling is carried out while holding the electroconductive film by an electromagnet.